

DELVE REPORT

Special
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Issue

A quarterly newsletter of unusual reports on various subjects. Published as an exchange with others of a like nature. Send comments to: Gene Duplantier, 17 Shetland Street, TORONTO, Ontario, Canada M2M 1X5

Canadian scientists are about to present a plan to send battalions of miniature robots on a mission to Mars

BY PETER BOISSEAU

SENDING swarms of miniature robots to explore alien planets is a popular theme in science fiction, but it may be on the verge of becoming reality.

Researchers at the University of Toronto are heading a project with government and private-sector funding on multi-agent network robotics — a large number of small robots that can work individually or as a collective. And they're aiming to see them space-bound within five to seven years.

"The idea is to make them small enough, light enough and autonomous enough that they could piggyback on another mission," says Ernest Earon, a space robotics research assistant at the University of Toronto's Institute for Aerospace Studies.

"You'd put a swarm of these palm-sized robots on Mars or an asteroid or the moon, and they would go about doing some pre-determined task, like seismology, sample return, the search for life, the whole works."

Ideally, using a network of independent "rovers" means the mission won't necessarily fail even if a number of them are disabled or malfunction. And if one of them finds something interesting, the others could come to its assistance.

"That's part of the problem we're really addressing," says Earon. "How do you get a network of robots to adapt to losses in numbers, or even help each other out?"

The failure of NASA's Mars Polar Lander last December un-

derscored the importance of "not putting all your eggs in one basket," says Christian Sallaberger, manager of strategic development for the Canadian Space Agency, which is closely monitoring the research.

"I would predict that within the next 10 years, we'll see several missions that will involve networks of planetary rovers," says Sallaberger.

For instance, scientists have long coveted the idea of assembling a sensor array on the dark side of the moon for deep space astronomy.

"But you'd have to deploy that array over several kilometres of surface area," says Sallaberger. "So you could have a fleet of rovers that could just go out and drop these sensors off across the required area."

The research at the University of Toronto is just a small sample of

the work being done on collective robotics and miniaturization, much of it funded by the U.S. military and law enforcement agencies, who are interested in potential uses ranging from mine-sweeping to surveillance.

There's even a buzz about using micro-robot fliers the size of insects to slip into rooms and buildings through air ducts, science's answer to the proverbial fly on the wall.

Other studies are focusing on making real insects into "biobots," animals that can be controlled by using tiny radio transmitters attached to their bodies and guided into performing various tasks.

All of which has implications for the space robotics group, who are finding their own inspiration in nature.

While the early prototypes they have now are on wheels, they're

working toward developing legged robots, using the simple yet efficient joint structure of stick insects as a model.

They're also trying to mimic the kind of logic that can be found in the average ant.

"The traditional idea in robotics for a long time has been to try to code more and more complicated solutions to problems, using increasingly complicated processors to handle the added input," says Earon.

"We're going the opposite direction, in much the same way that insects and spiders work, in that they have very simple processing capabilities, being very small, yet they can perform incredible tasks."

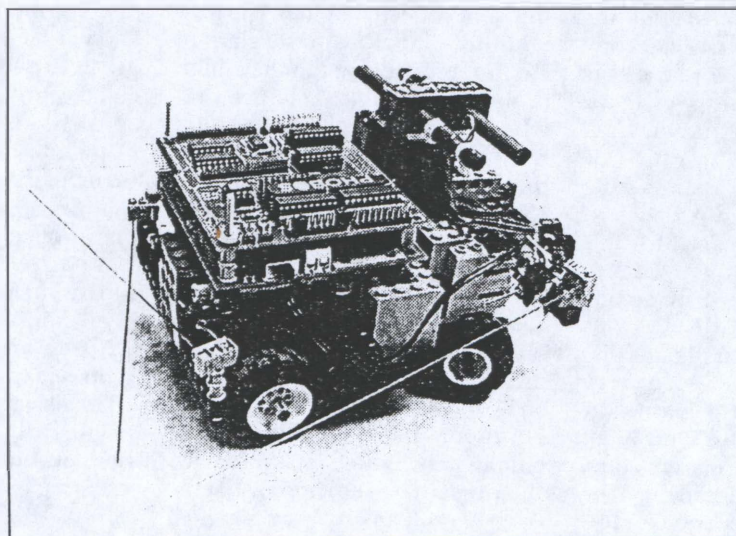
They want to endow each robot with the same kind of basic programming for routine tasks like turning left or right, and a palette of behaviours it can choose from to solve problems, like moving an object from one location to another.

"We're not trying to give our robots intelligence," says Earon. "We're trying to give them the ability to perform. To react, as opposed to reason."

The next step is to design an actual mission using the robots, the subject of a joint proposal to the Canadian Space Agency by the University of Toronto researchers, several space technology companies and scientists at universities in New Brunswick and Calgary.

"The idea is to have a plan ready by the end of the year for a network of flight-ready rovers," says Earon. "We're gunning for a couple of mission possibilities in 2005 and 2007."

National Post



Phobos, the initial design of a surface rover for planetary exploration.

UNIVERSITY OF TORONTO INSTITUTE FOR AEROSPACE STUDIES

The discovery of many new planets is causing the search for life beyond Earth to intensify

BY CLIVE COOKSON

Planets are the hottest topic in astronomy as the science moves into the new millennium. Just five years ago we had to take on trust the astronomers' claim, on the basis of theories of star formation, that our galaxy contained millions of planets; no one had any direct evidence for any of them beyond our own solar system.

Now we know of about 30 "extrasolar" planets. Their existence has been inferred from the slight wobble they cause in the orbits of their parent stars. But the most exciting news came last month, when two research teams published direct evidence.

First, Geoff Marcy, of the University of California, Berkeley, and his U.S. colleagues recorded the passage of a planet in front of its star, dimming the amount of light reaching Earth by about 2%. Then a British group, led by Andrew Collier Cameron, of St Andrews University, directly recorded the starlight reflected from a planet 55 light years away.

Why all the fuss? Some astronomers are fascinated by planets as objects in their own right and some by the new evidence being shed on the way star systems form out of interstellar dust and gas.

But the main excitement is that life — or, at least, any sort of life that terrestrial scientists can conceive of — requires a planet on which to originate and evolve; no other object in the known universe can provide the range of temperatures and pressures suitable for biochemical processes. Astrobiology, the search for life beyond Earth, is going to be one of the great themes of space science in the 21st century.

In fact, the extrasolar planets discovered so far do not seem very hospitable. They are giants, at least as big as Jupiter, and most are very close to their parent stars, so their conditions are likely to be too hot and too pressurized for life.

Take, for example, the blue-green "Millennium Planet" observed by Collier Cameron's team at the 4.2-metre William Herschel telescope on La Palma in the Canary Islands. It is twice the diameter of Jupiter, the largest planet in the solar system, and is so close to the parent star, Tau Boötis, that its atmosphere is a chemical cauldron with a temperature estimated at 1,700 degrees Celsius.

That is hot enough for metals such as sodium and potassium to exist as trace gases in a hydrogen atmosphere above clouds of magnesium silicate droplets. "It is possible that these trace elements in the atmosphere explain the lack of yellow and violet light," says project scientist Alan Penny, of the Rutherford Appleton Laboratory in Oxfordshire.

Extrasolar planets are so distant, so small and so dim as to be

ASTROBIOLOGY TO BE ONE OF GREAT THEMES OF 21ST CENTURY

at the very limits of detection. Only the largest ones, orbiting close to stars, can be detected from their gravitational effect.

The British scientists pushed existing technology even closer to its limits when they disentangled the faint reflected light of the Millennium Planet from the glare of Tau Boötis. Indeed, they say there is about a one-in-20 chance that what they detected is an artifact rather than a genuine signal from the planet.

The team hopes to remove this uncertainty by further observations over the next few months, while obtaining enough spectroscopic information to make the chemical composition of the atmosphere more than conjecture.

The detection of Earth-like planets or moons elsewhere in our galaxy may just be possible with the present generation of Earth-based and orbital telescopes,

given further improvements in computing and signal processing. But astronomers are pushing the European Space Agency and NASA for something far more ambitious.

Space scientists have proposed a mission, called Darwin, that could detect Earth-like planets orbiting any of several hundred nearby stars and, more significantly, show whether oxygen is present in their atmosphere.

This would be an unambiguous signature of active biology because there are no known chemical processes, apart from living systems, that could give rise to an oxygen-rich atmosphere.

The technical requirements for Darwin are formidable. A laser-guided flotilla of five or six unmanned spacecraft, carrying one-metre infra-red telescopes, will have to fly in exact formation with extraordinary precision for several years, keeping 200 metres apart, to within less than 1,000th of a millimetre. They will remain in an orbit about 1.5 million kilometres further out from the sun than Earth, where interference from heat and dust is less than in the inner solar system.

The flotilla will act as a giant interferometer, looking systematically for the infra-red spectra characteristic of oxygen, water and simple organic molecules.

Both the cost and the technical requirements are formidable but development work has begun. Darwin could be launched in 2012, as a European mission or a collaborative venture with NASA.

If Darwin goes ahead successfully, it should give chemical signatures of Earth-like planets, but their images will be no more than points of light around their parent stars. To obtain any sort of picture of the surface would require an even more ambitious project, with an array of 10-metre telescopes in the outer solar system.

That is well beyond present technical capabilities and space agency budgets but might be viable in 20 years if planets are still a hot topic.

Financial Times

The experiences of alien abductees range from joyful encounters to tales of mistreatment.

A UFO conference helps these marginalized people cope with their ET contacts

Sleeping with the aliens

BY JONATHAN GATEHOUSE

LARAMIE, WYO. • Tired of ridicule, heart-sick over ruptures with family and friends, still fearful of the disapproval of employers, the 150 participants at the 21st annual Rocky Mountain UFO Conference are steeling themselves to tackle the final frontier of disenfranchisement.

The time has come to get alien abductees out of their spaceships and into the streets.

The centrepiece of the conference, which claims to be the only UFO gathering entirely devoted to abductees, is two "closed sessions" where participants can talk at the microphone about their direct extraterrestrial contacts.

Tom and Joan Bishop of Anderson, Calif., tell of joyful encounters with superior beings that left them filled with peace and happiness. The retired engineer and his wife have been coming to the conference since 1992 and claim to have had dozens of run-ins with extraterrestrials since the late 1960s.

"I think it's very important for people to be able to open up," said Mrs. Bishop, a slender woman dressed in a leopard print shirt and wearing a holographic pin of a bug-eyed alien. "As they say, you're as sick as your secret."

Mrs. Bishop tells the group about a sighting on a lonely California highway during a lunar eclipse four years ago. Later, at home in bed, the couple were visited by two tall humanoids from the planet Pleidias. Mrs. Bishop arose and followed them to the living room. When she tried to hug one, she was blown into a rocking chair by the power of its internal life energy, she said.

"When I was shocked back into the chair, the realization of my place in the cosmos came to me. I said to them, 'I'm one of you, aren't I?'"

Janet, a speech pathologist from Colorado, is more reluctant to go on the record with her harrowing

tales of mistreatment by The Greys, the small creatures with the oversized heads and large eyes that seem to feature prominently in most stories of abduction.

"I really do feel like the government is messing with me," she said. "And you have to be quiet or you could lose your job."

Janet said she has been kidnapped on a regular basis since she was two years old. Aliens often harvest her eggs and she believes that she has produced several hybrid children for them.

She is an active participant in the workshops and lectures, easy to pick out of the audience because of her vibrant pink-and-purple Hawaiian muumuus and her practice of crocheting an afghan while

Janet's two sons aren't alone. In an era where tell-all books, talk radio and trash TV regularly put the dark secrets of the soul on display, there is still a reluctance for those who have had direct contact with beings from other planets to come forward and share their experiences.

Even within the UFO community there is a bias against abductees, said Franklin Carter, president of the Institute for UFO Research, the group that organized the three days of lectures and workshops at the University of Wyoming. Those who claim to have seen flying saucers or bright lights in the sky are not always comfortable being lumped in with those who profess having had much closer encoun-

The bulk of the weekend is filled out with a bewildering smorgasbord of lectures and workshops that could provide the basis of several seasons worth of *X-Files* episodes.

Bob White, a silver-haired 69-year-old from Missouri, displays the piece of a UFO that he claims to have recovered in the Colorado mountains. The 28-cm-long metallic object is shaped like a ham bone, with a groove down one side and partially melted scales on its exterior.

Mr. White, a former country singer and winning contestant on *The Gong Show*, weaves a complicated tale of duplicitous scientists and television producers who have tried to profit from his discovery. Despite four laboratory tests, he claims experts have yet to determine just what the object is made of and whether it has an earthly provenance.

Anna Hayes, a frenetic blond dressed in a royal purple suit, delivers an infomercial-paced 90-minute lecture on the three alien civilizations vying for control of the Earth and the Amenti star gates that open every 26,566 years. Her hand-drawn overhead transparencies provide detailed composites of more than 15 different types of aliens she has encountered on her astral travels. The condensed version: Greys bad, Reptilians very bad, tall pretty humanoids extremely good.

Pamela Stonebrooke, a forty-something bleached blond Los Angeles musician who lists performing at pornographer Larry Flint's wedding among her accomplishments, is flogging copies of her autobiographical account of alien contact — *Experiencer: A jazz singer's true account of extraterrestrial contact*.

Ms. Stonebrooke thrills the audience with her accounts of fabulous sex with the bad-boy Reptilians.

"I'm one of the few that have had Reptilian contact that didn't have an orgasm," she confides, "because I changed the [body energy] frequency and he was gone."

National Post

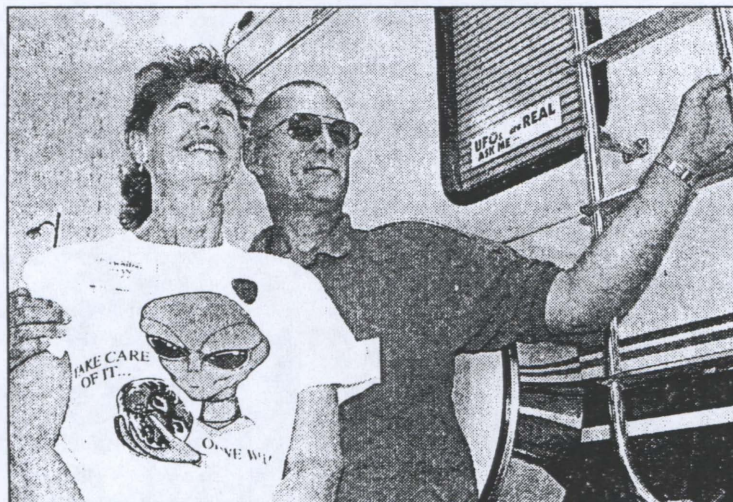
'I THINK IT'S VERY IMPORTANT FOR PEOPLE TO BE ABLE TO OPEN UP'

she listens to the speakers. She is particularly interested by the oft-repeated theory that there may be some hereditary link to the alien visitations, with generations of families falling victim to the kidnapers.

"Both my boys are involved but they're both in denial," she said.

ters.

"Our object is to provide information to help people integrate these experiences into their daily lives," he said. "They've had a traumatic experience, their whole belief system has been turned upside down. But you still have to make your car and house payments."



TIM CHESNUT / LARAMIE DAILY BOOMERANG

Tom and Joan Bishop claim to have had dozens of encounters with extraterrestrials since the late 1960s.

ASTRONOMY

Milky Way and Andromeda galaxies on a collision course

Supercomputer simulation of merger into a blob

BY KENNETH CHANG

Milky Way, are speeding toward each other at more than 400,000 kilometres per hour. In three billion years, the two galaxies may slam together head-on.

Astronomers cannot yet say whether the two are destined to collide or merely to speed past, narrowly missing each other.

But, if their paths do cross, computer simulations now provide a preview of that celestial crash.

Using the latest, biggest, fastest computer at the San Diego Supercomputer Center, two astronomers, Lars Hernquist of Harvard University and John Dubinski of the University of Toronto, have calculated the motions of 107 million particles representing the contents of the two galaxies.

"We took a collision where it's

mostly head-on, but it's slightly offset," Hernquist said.

Given that outer space is mostly empty, individual stars would very rarely, if ever, run into one another, the astronomers say, and the hundreds of billions of stars in the two galaxies would continue to burn, unaffected by the merger.

But gravitational forces would radically shuffle around the stars' locations.

As the two initially graze past each other, the gravitational forces pull off strands of stars into "tidal tails," ripping apart the galaxies' pinwheel shapes and casting tens of billions of stars into the dark, intergalactic void.

About two billion years later, the Andromeda and the Milky Way merge into one mangled blob.

The detailed simulations could help astronomers figure out whether the football-shape elliptical galaxies they observe are the result of spiral galaxies that have collided and combined. Some elliptical galaxies have streams of stars orbiting around them.

For anyone left on Earth three

billion years from now, the night sky would become almost totally black if the sun were one of the stars cast out into the void.

If the sun and Earth were pushed in the other direction, toward the centre of the merging pair, the view would brighten considerably. When galaxies collide, hydrogen gas left over from the formation of the galaxies is sometimes pushed toward the centre, sparking a new epoch of star-making.

"When you slam that much gas together, you can ignite these starbursts," Dubinski said. With more stars, there would be more supernovas, the explosive deaths of the largest stars.

"There are these celestial fireworks that will be going off for tens of millions of years," Dubinski said.

A supernova too close could kill off any remaining life on Earth, though the end of the world would be near in any case. By the time the two galaxies completed their merger the sun would have burned out.

The New York Times

Within the constellation Andromeda is a dull, fuzzy patch of light.

This is the spiral-shaped Great Andromeda galaxy, 23 billion billion kilometres away, the furthest object one can see with the naked eye.

It is getting closer.

Like the headlight of a distant, oncoming car, this little patch of light will slowly brighten and sharpen over the aeons. Andromeda and our own galaxy, the

NATIONAL POST, FRIDAY, MAY 26, 2000

The sex files

Re: Sleeping with the Aliens, June 26.

It's ironic that the ridicule of a group of people who have had a contact with an intelligence outside our narrow spectrum of consciousness should be sanctioned by society when it is so clearly a violation of the human rights of a legitimate minority group.

Anyone who takes the time to personally examine the growing literature on abduction and to interview people who claim to have had this experience will quickly realize this is a subject that merits serious study and consideration.

In the case of an experiencer such as Pamela Stonebrooke, who has been brave enough to go public with her account of a sexual encounter with a Reptilian, she is only one of many others who have reported this admittedly bizarre event.

Journalistic cheap shots merely serve to keep the public in ignorance of the latest developments regarding an inexplicable but fascinating phenomenon.

John Oliphant, Vancouver.

NATIONAL POST, FRIDAY, JUNE 30, 2000

Ogopogo staying in Manitoba

SHOWBIZ

The Ogopogo feature film is back on track for shooting this summer in Manitoba. Winnipeg producer Kim Todd said Wednesday that financing for the film has been secured and shooting will begin in late August. The local film industry was sent reeling last week when word spread that the project — the most expensive movie ever to be shot in Manitoba — was about to be lured away to New Brunswick. Todd said the film's budget was higher


than the German financiers had planned and the Manitoba tax grant was less than they were expecting; the lure of a big windfall for the investors from New Brunswick never materialized. Todd said the film's \$25-million budget will be trimmed, but added that the cutbacks will not affect the almost \$10-million to be spent in Manitoba. The animatronic Ogopogo creature has been built in England by the Jim Henson Creature Shop, responsible for the *Muppets*, *101 Dalmatians* and *Indian in the Cupboard*. *Winnipeg Free Press*

THE TORONTO STAR Thursday, June 1, 2000

Ethiopia

FARMERS HIT BY FALLING FISH

Drought-stricken peasant farmers tending their fields in southern Ethiopia got a nasty shock when the heavens opened and they were pelted by fish, a local newspaper reported yesterday. Saloto Sodoro, a fish expert in the region, attributed the phenomenon to heavy storms in the Indian Ocean which swept up the fish before shedding them on the unsuspecting farmers.

 Wednesday, July 5, 2000

'I saw Bigfoot', doctor says

Psychologist Matthew Johnson insists he's not crazy. Even when he tells people he heard, smelled and saw the mythical Bigfoot while hiking with his family at Oregon Caves National Monument.

"It was very tall, it was very hairy," Johnson said. "It was nothing else but a Sasquatch. I swear to God."

Johnson said he was squatting in the woods near one of the monument's backwoods trails when he spotted the creature standing upright about 60 feet away, hiding behind a tree.

Bigfoot, or Sasquatch, is the name given to a large, hairy, ape-like creature reportedly living clandestinely in the woods of the Pacific Northwest.

Associated Press

Meteorites are a gift from the sky for scientists and a mini cash crop for farmers

It came from outer space

BY JEANNIE MARSHALL

Professor Robert Folinsbee joined the University of Alberta in 1946 as a geologist. But in 1960 when he was sent out to collect samples of a big meteorite that had fallen in Bruderheim, a farming community near Edmonton, he discovered that the haggling skills of a Moroccan rug merchant would have been even more useful. Geology, it seems, is not just about rocks and minerals.

"It was a major fall," explains Folinsbee, now professor emeritus. "There were thousands of pieces, but the big pieces weighed about 20 to 50 pounds each. They fell on frozen ground, on farmland, so they didn't plough down into the earth, they just went through the snow, hit the frozen earth and bounced back up making them easy to find against the snow."

Since most people had seen the big fireball in the sky and heard the explosion, the farmers had some idea where the fragments landed. The next day they picked a lot of them out of their fields.

It wasn't long afterward that Folinsbee came to call. "The university authorized me to go out and collect samples. They gave me some money and said pay whatever is a fair price for them," says Folinsbee.

This was the beginning of the Earth and Atmospheric Sciences department's meteorite collection, now second in size to the national collection in Ottawa. Since 1915, the collection had consisted of only one specimen: a piece of the Brenham, Kansas, pallasite. So the Bruderheim meteorite was seen as a wonderful opportunity to collect specimens practically in their own backyard.

But since they didn't quite land in their own backyard but rather in farmers' fields, Folinsbee had to cut some deals.

"The meteorite is part of the farmers' crop. No one can just go in and collect them in the field at random. It lands on their property and it's part of what they can sell off their land."

The farmers were for the most part pleased to sell and after consulting mineral catalogues and gauging what museums in other parts of the world might

pay, Folinsbee and the farmers came to agree on \$2 a pound, quite a deal for the university by today's standards. "If you had a couple of 50-pound rocks on your land and not much use for them, you wouldn't mind if someone offered you a few hundred dollars and then took them away," says Folinsbee.

Since the farmers had collected the samples so quickly, they were in pristine condition. Usually, meteorite samples end up sitting outside enduring the elements and can get rusty and beaten up. But these have a velvety black crust and a pure white interior.

Suddenly the department had some pretty good material to trade with other countries for pieces of their meteorites. In fact, Folinsbee traded a piece of the

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Bruderheim meteorite for a piece that landed near Vladivostok in Russia.

Alberta was again the landing pad for another big meteorite in 1964 near Peace River. This one fell at two o'clock in the morning so there were few observers to help locate the fragments. "The crucial witness was a farmer lying sleepless in his bed and the fireball passed by his window," says Folinsbee. "He was able to give us accurate directions."

Farmers have played a big role in the university's meteorite collection. Folinsbee kept a glass case outside his office with a few samples of rare meteorites. "One of the engineering students said he thought his father [a farmer] had an iron meteorite that looked like the one in this case," explains Folinsbee. "We went out and sure enough he found this one way back in the 1940s when he was ploughing his fields. He didn't know what to do with it, so eventually just

used it to keep the pigsty closed."

It's known as the Mayerthorpe meteorite and is estimated to have fallen 6,000 to 10,000 years ago. It's a big heavy chunk of metal, a combination of iron, nickel and cobalt, that could have been deadly had it actually hit anything other than a big open field.

Folinsbee says that meteorites seem to have a very good record for missing people. "One person is on record as being struck. It came through the roof of a house and through one floor and hit a woman sleeping in bed. It gave her a bruise on the head," says Folinsbee. "Quite recently a meteorite fell and struck a vintage car making a big dent in it. The girl who owned it sold the car for \$7,000 and the meteorite for \$20,000."

Though there haven't been any recent meteorites falling on Alberta, Folinsbee was fortunate to have been at the university when one fell north of Fort McMurray in 1979.

That fireball went through the sky during the daytime, but a young boy who was interested in meteorites interviewed people who had witnessed it and sent the data to the geology department at the University of Alberta. Folinsbee organized a search team and they had the young man work in the field along with them. He has since gone on to become a meteor specialist.

Folinsbee has been lucky to have so many meteorite samples land in his own province, but he has travelled a little to find them, too. "There was one time a Spanish-speaking colleague and I got in a car and drove down to Mexico," says Folinsbee.

They travelled to Allende in Mexico and bargained with the local people for pieces of a meteorite that landed in their fields.

"We loaded up the car with about 150 pounds of material and drove back," he says.

Big rocks and chunks of metal have been falling from the sky and crashing to Earth for thousands of years, but Folinsbee credits the interest in space science around 1960 with the renewed interest in meteorites. The Bruderheim meteorite fall in 1960 was like a little gift from outer space to get the collection going. "It was lucky," says Folinsbee.

National Post

Tiny Alberta farm town yearns for alien invasion

Residents roll out red carpet for little green men

ST. PAUL, Alta. (CP) — After 33 years, people are still waiting patiently for little green men to land at this small farming community's UFO landing pad.

Built in 1967, the structure is supposed to draw visitors — alien and otherwise — to tour the Polaris Arena, stay overnight at the Galaxy Motel or grab a slice of pie at Mama's Flying Saucer Diner.

But for some reason (a wrong left turn at Andromeda?) the spaceships keep missing the place.

"We should probably look at painting a big bull's-eye on the landing pad to make it easier to spot from way up there," jokes Rhea Labrie, the town's UFO consultant.

To keep the faith and the tourist dollars flowing, St. Paul

is hosting UFO Conference 2000 this weekend. The three-day meeting is complete with photo displays and speakers on paranormal activities such as UFO sightings, crop circles and animal mutilations.

Labrie says more than 500 humanoids from across North America will attend.

'A lot of evidence points toward aliens . . . but I have no proof of it. Seeing is believing, eh?'

— UFO EXPERT FERN BELZIL

"Most of the participants come because they have seen things," says Labrie. "They are looking for answers, more information to put their experience into perspective."

One of the experts is Fern Belzil, a 70-year-old former cattle rancher who has investigated 46 mysterious mutilations of farm animals.

While he hasn't made up his mind yet on whether aliens are responsible, Belzil says some of

the discoveries have been pretty spooky. Especially when there are no tracks, no blood and no evidence of a struggle. Often the animal's genitals have been removed with almost surgical precision.

"It makes you wonder who did this. It sure as hell wasn't predators or cults," he says. "A lot of evidence points toward aliens . . . but I have no proof of it. Seeing is believing, eh?"

Ted Phillips, another speaker at the conference, is a specialist on UFO sightings.

The civil engineer from Branson, Mo., has been chasing down flying saucer reports since 1968 and has so far probed 2,300 cases in 79 countries — including Canada.

Phillips says UFO sightings now number about 200 a year in Canada — mostly in August and September. Most are reported in Ontario, followed by Saskatchewan and Alberta.

"Only about 15 per cent of the reported landings involve (alien) humanoids — little guys."

PHYSICS

Earth's core rotates faster than the surface

WAVES COMPARED

It makes an extra revolution every 2,400 years

PARIS • The Earth's core rotates more quickly than the rest of the planet, making an extra revolution every 2,400 years, according to results of a U.S. study published yesterday in the British journal *Nature*.

The findings could help researchers to better understand how the Earth's core generates its magnetic field, according to a team of researchers led by John Vidale, physics professor at the University of California in Los Angeles.

From a recording station in Montana, Vidale's team studied scattered waves created by two Soviet nuclear tests conducted in 1971 and 1974 off the Arctic island of Novaya Zemlya.

The work done by Vidale's team confirmed preliminary research done in 1996 by two U.S. scientists who analyzed seismic waves in Alaska, produced by earthquakes in the Sandwich Islands and Antarctica from 1968 to 1996.

In the Alaska study, the seismic waves had passed through the core of the Earth, providing data on its structure and movements.

Scientists led by Vidale recorded waves on the core's surface, not those that crossed through the core, discovering a 0.15-degree difference between the core's rotation and that of the rest of the Earth.

The study said the results could be used to test the assumption that the difference in rotation occurs around the Earth's north-south axis.

Agence France-Presse

MONDAY, JULY 10, 2000 metro

Scientists find hardy microbes

In a finding that could have an impact on the search for life on Mars and other planets, scientists say they have detected hardy microbes that seem to thrive in the radiation, cold and darkness at the South Pole.

"If the team's conclusions prove true, the discovery not only has important implications for the search for life in other extreme environments on Earth, but also for the possibility that life — at least at the microscopic level — may exist elsewhere in the solar system," the National Science Foundation said.

The research on the South Pole microbes, which was supported by NSF, was published in the journal *Applied and Environmental Microbiology*.

Tough organisms

Evidence of the tough little organisms shows them to be active even in the extreme conditions of the South Pole.

A similar species lives elsewhere in Antarctica, but the microbes at the Pole seems to have managed to adapt themselves to the scarcity of liquid water and ultraviolet radiation from the sun there. (Reuters)

Truth out there

Re: Canada's X-Files Grow Dusty As Fewer People Spot UFOs, Dec. 13.

I am not surprised that people who see UFOs in Canada don't bother reporting their sighting to Transport Canada's Aviation Operations Centre and to bureaucrats such as Mike Hunzicker, who believes anyone who sees a UFO is "drunk." In fact, UFO sightings have exploded around the world in the past three years, with the number of sightings in Canada at an all-time high. Recent sightings over China and throughout Asia, as well as a torrent of reports from the United States, Europe and Mexico, indicate that UFOs are far from being a "non-issue."

John Oliphant, Vancouver.

NATIONAL POST, SATURDAY, DECEMBER 18, 1999

*A robot the size of a Volkswagen Beetle will seek out
and classify meteorites in inhospitable Antarctica*

Searching for space rocks

BY WARREN E. LEARY

Humans have long ventured to Antarctica to study and make discoveries on the icy continent. Now, a new breed of explorer — a metallic robot crammed with wires and electronics — is poised to add its name to the annals of polar history: Nomad, the meteorite hunter.

Nomad, a four-wheeled machine built by Carnegie Mellon University's Robotics Institute in Pittsburgh, is in Antarctica to see if it can discover something without human assistance. The achievement would be a first for a robot.

The machine is designed to search rock-strewn areas of ice that are known to harbour meteorites and pick out the objects that fell from space from among ordinary rocks and stones. Nomad's builders believe the robot has enough intelligence to sort out information from its sensors and choose the rocks composed of extraterrestrial material, a job normally done by humans experienced in meteorite detection. They hope Nomad will discover at least one new meteorite on its own.

William L. Whittaker, the project's principal researcher, said past exploration robots, such as those sent into space or far down in deep oceans, had been drones that simply transmitted information for humans to evaluate.

"Until now, explorative robots have taken pictures, gathered data and returned what they viewed to scientists who made judgments and decisions," Whittaker said. "This time, Nomad will make its own judgments."

Nomad and half a dozen engineers and graduate students who are supporting its mission arrived in December at McMurdo Station, the main U.S. base in Antarctica. The 720-kilogram robot, outwardly about the size of a Volkswagen Beetle, was taken by helicopter a week ago to its testing area 290 kilometres northwest of the base for three weeks of field trials.

Nomad is powered by a gasoline-driven generator that supplies electricity for its computers, communications, scientific instruments, high-resolution digital camera and propulsion. Each of its four metal wheels, covered with met-

al-studded snow tires, is powered by a separate electric motor.

The vehicle, which can expand its chassis to go over obstacles one-metre tall or use its laser range-finder to help go around them, is designed to move at about 45 centimetres a second as it surveys an area.

Dimitrios Apostolopoulos, a systems scientist at the Robotics Institute, who is project manager for Nomad, said the robot would test its skills under increasingly challenging conditions. Some parts of the test area are flat ice sheets studded with occasional, distinct rocks, while others are moraines, dense concentrations of rock and rubble deposited by glaciers.

Nomad will search in patterns similar to those used by people mowing grass, Apostolopoulos said, and use its camera to scan thousands of rocks for characteristics of meteorites, such as shape, colour, lustre, size and evidence of charring.

When it sees a good candidate, the robot will move in for detailed examina-

'ROBOTS ARE HAPPY TO DO JOBS THAT ARE REPETITIVE AND BORING'

tion with instruments on the end of a movable arm, including a close-up minicamera. Nomad will touch the rock several times with a reflection spectrometer, which shines a light on the object and analyzes the spectrum of the reflected light to tell what elements are present. Then the robot will use a metal detector to sense the presence of iron — a major component of some meteorites — and do computations to classify the sample.

If Nomad decides a rock is a meteorite, it will radio the object's exact location to the researchers using co-ordinates calculated by the satellite-based Global Positioning System. Later, people will retrieve the specimen to confirm or reject Nomad's findings.

"Nomad will not only say if a rock is a meteorite or not, but it also should be able to tell what type of terrestrial rock it is," Apostolopoulos said. "It's more than a yes-or-no decision."

The project, which has so far cost about \$3.5-million (US), is sponsored by the National Aeronautics and Space Administration's Office of Space Science, which is interested in sending intelligent robot explorers to other planets.

On distant worlds, where the simplest, round-trip radio communication can take hours, it would be impossible for humans on Earth to guide a robot. Scientists need robots that can fend for themselves in unknown, hostile environments and that are smart enough to recognize and assess the unexpected.

Engineers at Carnegie Mellon felt the Antarctica would not only be a good place to test such robots in a distant, harsh environment, but also to demonstrate their ability to do useful work. Conditions in Antarctica make it a reservoir for meteorites: Since 1969, scientists from the United States and Japan have collected more than 20,000 meteorites near certain Antarctic mountain ranges where they have been preserved in the ice for thousands of years. Glacial movements gradually concentrate the space rocks in discrete areas and push them to the surface, where experienced searchers can recognize them by their unique outer characteristics.

Apostolopoulos said the Nomad team decided not to take along any spare parts for major systems, eliminating the possibility of doing any major mechanical work in the field. "This is a conscious decision that forced us to work on reliability, to make the robot rugged. We have to make the case that it will work in space, where there won't be any mechanics around to fix it if something goes wrong."

Ralph P. Harvey, of Case Western Reserve University, who directs the National Science Foundation's Antarctic Search for Meteorites program, said the human eye and brain were the best instruments for detecting meteorites among similar-looking rocks, and he did not see machines replacing humans as primary spotters. But robots could have a supplemental role in cleaning up samples left behind after a human search.

"Robots don't lose their concentration and are happy to do jobs that are repetitive and difficult, allowing humans to do something else that might be more exciting and profitable," Harvey said.

The New York Times

Do cyborgs live among us?

BY JAY BOOKMAN

The future has many birthplaces. Part of it is taking shape in the cramped and cluttered laboratory of John Chapin.

Chapin and his team wired the brains of lab rats directly to a computer, giving the animals an ability unknown to human beings.

When the rats got thirsty, they would use a robotic arm to bring them water. That kind of task has become almost second nature to lab rats, but these animals did it with flair. They operated the device with their minds alone, moving it merely by thinking about it.

"When people first heard about this work, I'd get e-mails wondering whether people could use a mind-controlled robot to mow their lawns," jokes Chapin, a neurobiologist at MCP Hahnemann University in Philadelphia. "But my mind worked differently. I was thinking about a robot that could bring me a beer."

By linking a living brain to a computer and then allowing the two to communicate, Chapin has broken down a barrier between the animate and inanimate worlds. He has given a living mind the power to directly affect the outside world without having to use the body in which it is housed.

He's hardly a lone researcher.

Thousands of scientists around the world, working quietly in fields as varied as linguistics, biology, chaos and robotics, are in their own ways blurring the boundaries that once separated "wetware" — the living brain — from the hard-

ware of silicon-based computers. At the furthest frontier, some scientists are building computers out of living brain cells.

Their research represents the next world-changing generation in computer science. It promises to produce computers that seem much more human and lifelike, and less like machines. It also will transform the relationship between human beings and computers. They won't be tools that we operate with our hands, as we do a hammer or a car. Instead, they will become almost a part of us, intimately linked to our minds and bodies and greatly augmenting human abilities to think and communicate.

At Wright-Patterson Air Force Base in Ohio, for example, the military's Alternative Control Technology Laboratory has experimented with systems that allow pilots to "fly by thought." By controlling their brain waves, human subjects at the laboratory can steer a flight simulator left or right, up or down, a skill that most people at the lab master in only an hour.

The term "cyborg" was coined in the '60s by NASA scientists. In a cyborg, computer hardware has become so much a part of a human being that it creates a new species — part machine, part human — with impressive new powers.

Some theorists argue that cyborgs are not a sci-fi fantasy, but already walk among us by the millions. They believe that a person with a cellphone and beeper on his belt and a Palm Pilot in his hand has attained cyborg status.

To many others, that's a stretch. They see their electronic gizmos as tools, not as an integral part of

themselves. But the cyborg description will become far less strained if researchers in the growing field of wearable computing are proven right. They are trying to tear down the second major barrier between human beings and their electronic assistants: the size and weight of computers.

As computers get smaller, they will become extremely portable and powerful.

Every morning, human beings of the future may don a lightweight, unobtrusive computer just as we now slip on a wristwatch or tuck a wallet in our pocket. That computer would give them full-time wireless access to the Internet and

A FEW SCIENTISTS ARE BUILDING COMPUTERS OUT OF BRAIN CELLS

to other human beings equipped with wearables, as well as to e-mail, a cellphone and other services. At no waking moment would they be disconnected. They would become individual nodes connected full-time to a vast computer network shared by millions of other people.

Wearables are already used in the military and in industry. Through its Land Warrior program, the U.S. Army will equip a platoon of soldiers with wearable systems for war-fighting exercises this summer.

It plans to deploy 34,000 units in the field within the next few years. Businesses are buying wearables to let employees who

are out of the office or on the factory floor have fast, easy access to a computer database or the Internet. As the wearable product is refined through research and experience, companies hope to eventually produce the units for sale and use as consumer products.

Steve Mann, a pioneer in wearable computing and a professor of electrical engineering at the University of Toronto, has been building and using his own wearable computers since he was a high school student in Canada. He calls himself a cyborg. In fact, Mann says that in the 20 years he has worn computers, he has experienced a powerful synergy between human being and silicon, which he calls "humanistic intelligence."

"In my experience, the human being and computer become elements of each other's feedback loop," Mann explains. "They support and extend each other and create something new."

Cyborgs such as Mann have a close counterpart in the inanimate world: the machine equipped with human-like powers. That's the third major barrier now under attack: making computers more like people.

Researchers at the Massachusetts Institute of Technology are working on "affective computing" — computing that uses human emotion as a tool. If the computer senses its human user getting exasperated or angry, for example, it might employ the same frustration-reducing tactics that a human co-worker would use. It might apologize or suggest that the user take a break for a few minutes.

Likewise, software engineers are creating human-like characters that are capable of interacting with human beings, asking and answering questions, commenting on the weather, even flirting. They are like robots, but without physical bodies. Instead of operating in the physical world, they will live and work on the Internet, serving as guides and hosts on Web sites. The characters are programmed to have personal histories and quirks, just like human beings, and according to their creators are "emotionally and socially intelligent."

In pursuit of artificial intelligence, scientists are building artificial neural networks and teaching them to operate as real neural networks do in the human brain. A few scientists, instead of building computers that act like living brain cells, are building computers out of brain cells.

Bill Ditto, a Georgia Tech researcher in neurosilicon computing, leads a team that has built a simple adding machine out of the neurons of a leech. In five years, he predicts, his team will have built a much more complex machine out of living rat neurons grown on a sheet of silicon. Such a computer might be taught to think as living brains do.

Ditto is quick to reject any comparison to Mary Shelley's *Frankenstein*. "It's not like we're building something out of living body parts," he says.

"Well, OK, actually it is. It is a little Frankenstein, I admit. But we're not trying to create a new life form that's going to go out and do evil. We just want to build a living computer."

Cox Newspapers

The next trick is to make outer space pay its own way

Space may be the final frontier, but it seems that getting into space was the easy part. The next big challenge will be creating profitable businesses in space. *The Future of Space Exploration*, a journal published by *Scientific American*, has canvassed space-related businesses and it turns out there is more entrepreneurial activity in space than you might imagine. More and more people are starting to realize that lift-off is tied to the bottom line, adopting the motto "To go to space to stay, we have to make space pay." The National Aeronautics and Space Administration is moving in this direction. The International Space Station is currently being constructed and NASA is hoping to strike partnerships with private companies interested in manufacturing in zero gravity, with revenues helping to defray the station's \$40-billion cost. (All figures in U.S. dollars.) To prod things along, the U.S. Congress passed the Commercial Space Act last year that requires NASA to draft a plan for the privatization of the space shuttle. Two companies, Rotary Rocket and Kistler Aerospace, are racing to build a reusable launch vehicle. At stake is a \$10-million prize offered by the X Prize Foundation.

Sponsored by the St. Louis business community and modeled on prizes offered by pioneer aviators early in the century, the prize goes to the first privately funded team to fly a reusable three-person spaceship on two consecutive suborbital flights. SpaceDev, a publicly traded company, plans to send a \$50-million spacecraft to land on an asteroid by 2002. The company plans to make a profit by selling data from scientific instruments on the probe as well as offering payload space to university researchers. Another driver of commercial activity in space may be tourism. Buzz Aldrin, the Apollo astronaut and the second man to walk on the moon, has founded a company called ShareSpace to promote mass-market space travel. Two travel companies, Space Adventures and Zegrahm Space Voyages, are taking advance reservations for suborbital flights even though launch vehicles have not yet been built. Tickets will be in the range of \$50,000 to \$100,000. But rocket technology will have to become a lot more reliable. In the satellite launch business, a failure rate of 1% is considered not too bad. There are probably few space tourists willing to plunk down \$100,000 for a one-in-a-100 chance to be incinerated on lift-off. Greg Crone, *Financial Post*

NATIONAL POST, THURSDAY, FEBRUARY 3, 2000

HER HAIR SMELLED FAINTLY, SWEETLY OF ... METEORITES

PARIS • A bizarre fragrance that smells of meteorites has been developed by British perfume experts, *New Scientist* reports in Saturday's issue.

The wacky odour, called Cyba, smells "sulphurous, smoky, like gunpowder, metallic," according to its creator, Les Small, of Quest International, a company owned by the chemicals giant ICI.

The "futuristic, atmospheric" perfume — devised to show that the firm can emulate the smell of pretty much anything — mimics the molecules given off by carbonaceous chondrite, the commonest mineral found on meteorites.

Agence France-Presse

NATIONAL POST, FRIDAY, JUNE 9, 2000

METEOROLOGY

Giant ice cubes from clear skies tested in Spain

OZONE DEPRESSION LINK

Meteorite, comet and aircraft theories excluded

MADRID • Giant ice cubes that fell out of clear Spanish skies in January may have been a result of global warming, experts studying the freak weather phenomenon have said.

One chunk from Chilches in the east of Spain weighed four kilograms and measured 20 by 26 centimetres.

If the troposphere — the first 15 kilometres of the Earth's atmosphere — heats up, it can provoke cooling in the stratosphere, producing giant hailstones, accord-

ing to a report published in *Geotimes*, the American Geological Institute's magazine.

Satellite maps generated by the U.S. space agency NASA showed a depression in the ozone layer over Spain between Jan. 8 and 17, when the ice cubes fell, the report compiled by 14 Spanish scientists said.

Analysis of the ice cubes proved they were not meteorites or aerolites, such as comet tails, as originally thought.

The tests also ruled out the hypothesis that the ice had fallen from an airplane, said the head of the inquiry commission, Jesus Martinez-Frias, a geologist.

Only nine of the 50 ice cubes tested turned out to be authentic. The others were "discovered" by jokers or trouble makers keen for media attention, the commission said.

Documented incidents of this kind go back to the 19th century: for example, two kilograms of ice in Spain in 1826 and one kilogram in New Hampshire in 1851. In April, 1973, two kilograms fell in Manchester, England.

The commission said its report was not a definitive explanation.

Agence France-Presse, with files from *National Post*

NATIONAL POST, SATURDAY, MAY 20, 2000

ASTRONOMY

Comet detected three years after passing Earth

LONDON • Finnish scientists have spotted a previously undetected comet that passed through the solar system three years ago.

Teemu Mäkinen and colleagues at the Finnish Meteorological Institute in Helsinki found the comet, known as C/1997 K2, while examining old images from an instrument called SWAN on the SOHO satellite.

"From May to July, 1997, five comets were visible ... only four of which were previously known. The one passing through the southern ecliptic pole had been missed by all observers until identified from the SWAN images," they said in a letter in the journal *Nature* this week.

Although K2 should have been spotted easily from the ground, there were no reports of sightings.

The main purpose of SWAN is to study sun and solar wind, but Mäkinen and his associates said its images of the whole sky could be a helpful tool for spotting comets and other near-Earth objects that could cause a catastrophe if they collided with Earth.

Reuters

THE TORONTO STAR Saturday, February 26, 2000

Yukon

METEORITE PIECES FOUND

Two pieces of the meteorite that fell over the Yukon, northern British Columbia and Alaska last month have been found. NASA has identified the pieces as coming from the meteorite, which thousands witnessed as an intense flickering light over a 160-kilometre-wide and 200-kilometre-long area on Jan. 18.